CAPCOM Frank, when Bill wakes up, give me a holler. I've got a message for him too.

SC Houston, Apollo 8.

CAPCOM Apollo 8, Houston, go.

SC Roger. Are the guidance boys busy this morning?

CAPCOM They say they are.

SC I just worked outa NAV ... to move my landing logitude 6 degrees. east. I just want to compare with what they've got based on the same burn time (garble) 14 hours, based on the bias impact longitude determined from the P37 which is wrong. I'm indicating that I'de get a 600 foot per second Delta VC burn plus and my Delta VX changes to a minus 11.6 feet per second. I'd like to have that verified if I could.

CAPCOM Roger Jim. Stand by and I'll see if they copied all that.

CAPCOM Apollo 8, Houston

SC Go ahead.

CAPCOM The voice isn't too great right now and the guidance troops didn't get all that. How about waiting about 2 or 3 minutes, we'll flop on the antennas and we should get good voice transmission from you and then repeat it would you please.

SC Roger.

CAPCOM Okay.

CAPCOM Apollo 8, Houston. How do you read? Over.

SC Loud and clear.

CAPCOM Roger. We're reading you much better now. Jim can go ahead with his transmission to the guidance troops. They have one question before he starts. They would like to know what his view (garble) was at 114 hours. Over.

SC Roger. Wait one. The ... at ... was plus 07972.

CAP Roger. Plus 07972. Apollo 8, this is Houston. We are ready to copy your data when you are ready. Over.

APOLLO 8 MISSION COMMENTARY, 12/25/68,GET982100,CST9:12 AM,309/3

SC Okay Houston. Based on the P37 with minus.. solution, I got an impact longitude of minus 160.95. I biased it to get an impact latitude - longitude of 163.75. I wanted to change my impact point 30 degrees to the east and I tried to determine what my ... burn primers would be to do this and I got a Delta VX burn of minus 11.6 and a Delta VC of plus 600. Delta VY is zero. So that changed my previous Delta VX burn from minus 50.2. I just want to know if that meets with their approval.

CAPCOM Roger Jim. We copy and will run it through the mill and give you an answer.

PAO Apollo Control, Houston, at 98 hours, 28 minutes into the flight of Apollo 8.

APOLLO 8, MISSION COMMENTARY, 12/25/68, GET 985700 CST 9:48am 310/1

CAP COM This is Apollo Houston at 98 hours 57 minutes into the flight of Apollo 8. The Apollo 8 spacecraft now 179 989 nautical miles away from earth. Current velocity relative to earth 4124.3 feet per second. Capsule Communicator,Jerry Carr has passed along some flight plan update information to Apollo 8 and we will listen to that now.

CAP COM Apollo 8, Houston

SC Go ahead, Houston, Apollo 8

CAP COM Apollo 8, This is Houston with a flight plan update.

SC Go ahead.

CapCOM Roger. At 100 hours 30 minutes change star number 02 from one set to two set. Over.

SC Roger. Stars 02 from one set to two set

CAP COM Roger. Also set number 2 change star number 11 to star number 7. Over

SC Roger. 11 to 7.

CAP COM Roger Then after star set number 3 intiate PTP again Pitch 10 Yaw 45. Over

SC Pitch 10 Yaw 45

CAP COM Roger. At 101 hours 30 minutes delete the earth horizons settings. Over

SC 101 30 delete the earth horizons settings.

CAP COM That's affirmative. The folks here are evaluating the thermal situation looks like you will be out of PTC rather at an extended period of time. That's the reason we have you initiating PTC again there around 101 as soon as you finish those three star sightings. We are still working on the buff about the next ten hours. after 100 hours we are looking at the thermal situation.and the star sighting situation and we will be giving you more update later on. Over.

SC Roger. We really don't have a thermal problem at all now. All indications here are normal.

CAP COM Roger. Everything looks okay, just trying to look down the track aways.

SC I've often look down that way too.

CAP COM Roger.

SC ...

CAP COM Okay. Apollo 8, Houston.

SC Go ahead, Houston.

CAP COM Roger. Frank would like to talk to you a minute or two about the auto/funny you have been seeing throughout the nation. Over.

SC Go Ahead, Houston

CAP COM Roger. The problems you have run into so

Tape 60/ p 2

CAP COM far are due to some unkown source, probably EMI alike loading your T and C trunion cell it's now 91, So it really doesn't represent your true training angle. Now this loading problem we don't feel implies any decrease in the realibility in your C and C at all. We think that the best way circumvent the problem is to cycle the optic zero switch to off and then on prior to using the optic switch to any purpose. And with that procedure I think you probably went have any more problems. OVer

SC Roger. Jerry I notice one difference in REFS band and first we have trouble with and we got..... Notice in the first ... anomal option that was the very same procedure that ...

SC Roger. JCopy.

PAO Apollo Control Houston, Apollo 8 is a bit over 4000 thousand nautical miles away from that point in the flight pad. Will be recaptured by the earths ... influence. So at 99 hours 1 minute into the flight this is Apollo Control Houston.

End of tape

APOLLO 8 MISSION COMMENTARY, 12/25/68,GET993500,CST10:25AM,313/1

PAO This is Apollo Control, Houston, at 99 hours, 33 minutes into the flight of Apollo 8. Apollo 8 now 178,529 nautical miles away from earth. It's current velocity relative to earth is now reading 4141 feet per second. We've had some conversation with Apollo 8, since our last report, and we'll play that now.

CAPCOM Apollo 8, this is Houston. We are to come back on your entry navigation calculations. Over.

SC Go ahead.

CAPCOM Roger. We went through the charts and got exactly the same answer as you got. Looks like your procedure is very good. Looks like .. a real good head, you remembered to average out the velocity. We also went ahead and computed the problem to verify the chart and got a good solution. Over.

SC Roger. Thank you very much.

CAPCOM You're welcome.

SC Now if we can get our state pictures to agree, we'll be in business.

CAPCOM No sweat.

CAPCOM Apollo 8, Houston. Apollo 8, Houston.

SC Go ahead.

CAPCOM Roger, Frank. Is Jim listening?

SC Listening.

CAPCOM Roger. On your question about the option. Program 40 fits the preferred flag,...the next P52 will come up option 1, subsequent alignments after that come up option 2. Over.

SC All right. We understand. So 40 will have to come up with a (garble) burn with an option (garble)

CAPCOM Roger. Now concerning your restart that happened in Lunar oribt, for the peace of mind of the computer people, and the MIC folks, we have a question. Did Verb 34 enter to a flashing Verb 51 and P22 caused a restart. Over.

66/4

SC That sounds like it was it.

CAPCOM Roger. Thank you Jim.

SC That must be a "no no".

CAPCOM Yes Yes, that is a No No.

SC That almost caused an unscheduled EVA too.

CAPCOM Apollo 8, Houston. Biomed switch center. Over.

SC 3,2, 1, MARK.

CAPCOM Roger, Your MARK.

PAO Apollo Control, Houston. You heard conversation exchanges between Jerry Carr here at the Mission Control Center and both Jim Lovell and the spacecraft commander, Frank Borman. Bill Anders apparently must still be in a rest period. So at 99 hours, 36 minutes into the flight of Apollo 8, this is Apollo Control, Houston.

APOLLO 8 MISSION COMMENTARY, GET 100:12:00,GET11:03 AM,312/1

PAO This is Apollo Control, Houston, at 100 hours, 12 minutes into the flight of Apollo 8. Apollo 8 is now 176,166 nautical miles away from earth. Our current velocity reading relative to earth is 4161 feet per second. Let's hark .. back to one of our earlier air to ground discussions, an earlier reference to restart and unscheduled EVA involved a bit of banter on the part of spacecraft commander, Frank Borman. Apparently yesterday in Lunar orbit, Jim Lovell working with his computer, got one of his verbs or nouns a bit twisted. The computer reacted predictably by giving a restart. This came as unexpected event to the crew. Frank's reference in a jesting manner indicated that they felt a moment or two about tossing Jim out. We've had additional conversation with the crew since the last report and we'll play that now.

CAPCOM Apollo 8, this is Houston. It is about time for us to start keeping track of some command module RCS temperatures, so when you get a chance, we'd like the reading now, and we'll try to repeat it about every 8 hours or so.

SC Okay, we'll get them for you right now.

CAPCOM Roger.

SC You want the motor off the test meter, right?

CAPCOM That's affirmative.

SC The 5C is (garble) high.

CAP Roger, 5C (garble) high.

SC D high.

CAPCOM Roger, D high.

SC (garble) 5D, 6A is high, 6B is high, 6C is 5 volts, 6D is (garble) high.

CAPCOM Apollo 8, Houston. Roger, Understand 5Cand 5D are pegged high, 6A and 6D are pegged high, 6 Charlie is 5 volts, and 6 Delta is pegged high. Over.

SC That's roger.

CAPCOM Apollo 8, Houston.

SC Roger, go ahead.

CAPCOM Apollo 8, Houston. We're showing quad A running a little bit warmer than the other quads. If you remember, I mentioned before we were coming into a period of time here where we were going to spend a lot of time with no PTC going We'd like for you to try to favor quad A if you can, in the shade and do whatever you can to keep that temperature from getting out of hand. Over.

SC Roger, I'm only reading 121 on quad A.

CAPCOM Roger.
SC Quad C is the highest temperature we have. 122.
CAP Roger, Frank. We are more interested in the tank temperatures than the quad temperatures. Over.
SC Roger, I understand and listen, if you think it is that important, will just keep PTCing it and not do anything.
CAPCOM Negative. It no sweat right now. We're watching it and we just wanted to let you know that this thing is being looked at. If we get anywhere near a situation where we feel we ought to change, we'll go back to PTC or cool it.
SC Roger, thank you. We'll do our best but it is kind of hard though, you are sort of subject of ... geometry. Where ever the stars and the moon happens to be, that's where you point.
CAPCOM Roger. We understand. We're going to keep an eye on it down here and we'll keep you appraised.
SC Thank you.
CAPCOM Apollo Houston.
SC Houston, this is Apollo 8.
CAPCOM Roger, pass the word to jim that on these MARKS that are coming up, it is pretty important that he remember to record his Delta R and Delta V and trunnion. We are working low bit rate down here, so we're not going to be able to record that data from here. Over.
SC We are recording them all.
SC Houston, Apollo 8. Did you read that we are recording all the Delta R and Delta V and trunnion.
CAPCOM Roger. (garble)
SC Jerry, this is Apollo 8.
CAPCOM Roger, go ahead.
SC It looks like we have ..... directly ahead on top of us.
CAPCOM Roger, we understand but tank temperature is holding steady, so we are alright.
PAO This is Apollo Control, Houston. The reference to quads that dealt with the reaction control subsystem engine quads. From the ground we had a reading, or have a reading, from quad A which indicates that it is a bit above the temperature level of the other quads, some 7 degrees. We will be watching this and taking steps to balance the temperatures. So at 100 hours 17 minutes into the flight of Apollo 8, this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control, Houston at 100 hours 54 minutes into the flight of Apollo 8. The Apollo 8 spacecraft at this time is 175 220 nautical miles away from earth. At 100 hours 47 minutes 47 seconds the Apollo 8 spacecraft with its crew passed back into the earth's sphere of influence. It's current velocity relative to the earth currently reads 4184 feet per second. At this time we are in the process of undergoing a change of shift. Clif Charlesworth and his team now coming aboard. Since our last report we have had several transmissions from the crew and we are going to play those for you now.

CAPCOM Apollo 8, Houston. Over.

SC Go ahead, Houston, Apollo 8.

CAPCOM Roger, Frank. The helium tank temperature that we are watching on quad A has only gone up 1 degree in all this work that you are doing. So, we don't consider it to be to terribly serious. What we would like to do, as soon as you finish this P23 work, is rather than go back into PTC let's just roll her over 180 degrees and put quad A on the cool side, and hold it that way until your next activity comes up which is around 102 30. Over.

SC Okay. Fine.

SC it should be getting cool now, Jerry.

CAPCOM Roger, Frank. So far we haven't seen the temperature curve back down again. We expect to see it though.

SC Houston, Apollo 8.

CAPCOM Apollo 8, Houston. Go.

SC Roger. Give us the word when you want us to maneuver back here before that time that you (garble).

CAPCOM Wilco.

CAPCOM Apollo 8, Houston.

SC Go ahead, Houston.

CAPCOM Roger, Frank. We have some data that was missed on your P23. We'd like you to read it down to us if you have time.

SC Roger, we will in just a minute.

CAPCOM Roger.

SC Go ahead. What do you want?

CAPCOM Roger. On star number 2, the sixth mark, we missed delta R and delta V.

SC Sixth mark, that's - did Lovell pay you to do this? Come on Carr, come clean. Did he ask you to ask for this?

CAPCOM Who?

SC Jim Lovell.

CAPCOM Negative. We really missed it.

SC It's all zeros and all zeros.

CAPCOM Roger. All zeros , all zeros. Okay,

on star number 7, we lift the trunnion on marks 1, 2, and 3.

SC On 1, trunnion was 03235. On 2, it was 03240. On 3, 03241.

CAPCOM Okay, Frank, and then the last one is on star number 1. We missed the trunnion on mark 5.

SC 04064.

CAPCOM Roger. 04064.

SC Righto.

CAPCOM Thank you, Frank.

SC You're welcome, Jerry.

CAPCOM That Lovell is getting pretty proficient.

SC Not bad.

CAPCOM Apollo 8, Houston.

SC Go ahead.

CAPCOM Was that last number you read down to me mark 2 on star number 1?

SC That's right, star number 1, mark 2.

CAPCOM Roger. Thank you. Now that one got you on guidance.

SC Okay.

PAO Now this is Apollo Control Houston. Since the black shift is shortly leaving duty, we thought at this time that we would summarize the activities that we saw during this 9-hour period. When Glynn Lunney's black watch came aboard, we were very pleased to see a Christmas tree, a lighted Christmas tree here in the Mission Control Center which we understood was placed up sometime following the transearth injection burn. The shift itself was one of relative quiet. When the black team of controllers took over, Bill Anders was awake. During most of the period, the spacecraft was flying in passive thermal control attitudes. Shortly after taking over, we placed several calls in the blind to the spacecraft. This was not a matter of concern. In fact, it was more a matter of curiousity since we were receiving telemetry solid in getting to the spacecraft very easily with commands. The solution came when the ground reached Bill Anders and it turned out that the situation was probably one of a loose connector. Shortly thereafter, spacecraft Commander Frank Borman and Jim Lovell awoke. And Anders took a short-acting sleeping pill and retired. We passed along a flight plan update to the crew that put the first midcourse correction at 104 hours with a delta V of 5 feet per second. This burn of a very short delta, a very small delta V, we should say, is formed perpendicular to the radius factor and this would make it roughly perpendicular to the flight path itself. A little later, Jerry Carr, our Capsule Communicator, tried his hand

again as a newscaster and, in fact, passed up a couple of newscasts during the period of little activity. One based on wire service copy, the other based on a copy of the Houston Post. Then Command Module Pilot Jim Lovell, exercised a computer program. Computer program number 37, the return-to-earth program onboard to practice onboard computations for midcourses. There was considerable conversation played back and forth between the Mission Center and the spacecraft regarding this activity. A little later, Jerry Carr relayed the family Christmas messages to Frank Borman and Jim Lovell who were awake at the time. Bill Anders undoubtedly will receive one later when it's established that he is awake. As we mentioned earlier, we reached the Earth's sphere of influence at 100 hours 47 minutes 47 seconds, only a short while ago. Although this event took place only a short while ago, most of the morning as we viewed our space digitals display, we were reading them in terms of Earth reference. And the latter part of our shift, Jim Lovell worked again with the computer. On the onboard guidance and navigation system, we should say rather. In program 23, the cislunar navigation program. As you heard toward the latter part of the shift, we started looking at temperatures on quad A of the reaction control system. And the temperatures in the service module reaction control system quad A have been running about 10 plus degrees warmer than in the other three quads In order to maintain balance temperatures between quads and to avoid reaching any thermal limits in the propellant tanks, propellants the spacecraft just shortly before our flight control team went off duty . . .

END OF TAPE

it was maneuvered to place quad A on the shady side. When it will be maintained in this attitude until our next period of work activity emerges. So, at this point, with no news conference or change of shift schedule, change of shift briefing scheduled, Flight Director Glynn Lunney would like to extend to all visiting newsmen from all parts of the country a very merry Christmas. And at 101 hours 5 minutes 2 seconds into the flight of Apollo 8, this is Apollo Control Houston.

END OF TAPE

Who said newsmen don't like Lunney?
Mark Bloom?

PAO This is Apollo control Houston at 101 hours 17 minutes into the flight. and the Green team has taken over here at the control center.
In the last few minutes we have noted down here on the ground temperature QUAD A are reaction control system 4-way motor on the Service Module called Quad A is showing a slight rise in temperature it's about 10 degrees above where it should be. The other Quads are running 70 to 75 degrees quad A is presently reading 86 degrees F. So we ask Frank to roll the spacecraft around and put Quad A in the shade for a while. Trying to bring that temperature down. We are going to watch it, as yet it has not dropped. Here is some conservation that we had with the crewman.

CAP COM Apollo 8, Houston you are back under our influence again. Over

SC Very good. Things started speeding up now uh.

CAP COM roger. You have been in for about 20 minutes.

SC Very good. Jerry this is Jim.

CAP COM Go ahead, Jim.

SC Find out if the guidance group of a midcourse manuver of minus 4.8 dextant daugher (?) 14 hours would be better than the 15 we're doing capable of first.

CAP COM Okay minus 4.8

SC Right

CAP COM We have already started checking on it Jim. I bet you think that P37 passed us.

SC Big brother is watching.

CAP COM Afirm

SC Houston, Apollo 8

CAP COM Apollo 8, Houston

CAP COM Apollo 8, Houston Go

SC I just wondered how Jim .... is doing.

CAP COM We have seen no improvement as yet Frank.

SC Alright here is a

CAP COM 86 degrees

CAP COM Apollo 8 Houston

SC Go ahead.

CAP COM Ah roger, Frank we are going to arrange a range sequence now? We would like to keep com on the net for about 3 minutes.

CAP COM Over

SC Very well

PAO This is Apollo control Houston, here at 101 hours 19 minutes into the flight and that brings us up to date.
End of TAPE

PAO This is Apollo Control Houston at 101 hours 40 minutes. The next television transmission is scheduled for 104 hours 15 minutes. In about 2 1/2 hours from now. Should make it about 3 o'clock Houston time. That's pretty close we will refine that a little later. The rise in quad A is that we noted earlier is not, is no panic situation at all. It's about 10 degrees above where we plot that it should be. We have rotated the spacecraft around held it on the dark side for awhile. And now the crewmen have been advised to go back to passive thermal control, that gently rolling, barbequeing kink of motion, to see what effect that has on the, Uh, Quad A still running about 85 to 86 degrees. Here is the conversation which as developed over the last few minutes.

CAP COM Apollo 8, Houston range sequence complete. Over.

SC Thank you

SC Hello Houston, Apollo 8. How do you read?

CAP COM Apollo 8, Houston, loud and clear.

SC Houston, are you reading Apollo 8?

CAP COM Apollo 8, Houston loud and clear by me.

SC I wasn't reading you for a while, but I read you loud and clear now.

CAP COM Roger, Frank

SC I want to know what a range sequence desk ... was, Jerry.

CAP COM I was afraid you was going to ask that. Stand by.

CAP COM Apollo 8 Houston,

SC Go ahead

CAP COM Roger, this range sequence is phenomena we get on down voice backup. In this mode the ranging and the voice share the same channels so we have to periodically check and make sure that they are not interfering with each other. Over.

SC Thank you. That's a very education.

CAP COM Roger. We are learning a little bit down here too.

SC I hope you are studing reentry.

CAP COM No we're fat on those Frank.

SC Roger.

CAP COM Apollo 8, Houston.

SC Go ahead, Houston

CAP COM Roger, Frank
We would like for you to go back into PTC now. Your helium tank temperature is still holding about the same. and

Tc 328/1

CAP COM We are going to try to PTC to you and things out. Over.

SC Okay

CAP COM Apollo 8, Houston

SC Go ahead Houston.

CAP COM Is Jim listening?

SC He's not here right now.

CAP COM Roger. Trying to let him know that we repaired his latest P37. And these vectors have converged to they are very, very close now.

SC Your saying that your state vector and our state vector are very close.

SC That's affirmative, Frank

SC Is that right Jerry?

Okay I'll start a thank you (?)

CAP COM Roger

CAP COM But don't let his head get big.

SC Don't worry, it would be impossible to live with. He always was pretty sharp.

PAO And this is Apollo Control Houston again we got a little quiet period here, so lets run through some of the charts this morning for this afternoon. The cabin temperature of the cabin pressure is 4.9 pounds per square inch. We are looking at a cabin temperature of 78 degrees and yesterday I think we ran between 79 and 77. Showing presently 29 pounds of waste water aboard. Have 37 pounds of drinking water which means a full tank. In our oxygen quantities well up there, oxygen tank one is 68 percent oxygen quantities in two is 68 percent. Hydrogen quantities is 52 percent in tank one and remaining 54 percent in tank two. Great shape there. Temperatures on the cryogenic oxygen is minus 174 for tank one and minus 187 tank two. and hydrogen tank one temperature is minus 413 degrees F Tank two minus 414 degrees. In the weight department, Apollo 8 continues to lose weight at a very dramatic pace. Cause before we went into Lunar Orbit just prior to our Lunar Orbiting insertion burn, we had something on the order of 63 000 pounds While orbiting yesterday, we were down to 45 000 pounds Today after our transer injection burn we were down to 31 739 pounds. And we will continue to see that reduce as we get closer to home and particularly when we drop that service module. just prior to reentry. So all in all in 101 hours 47 minutes this is that's our status this is Apollo Control Houston.

END OF TAPE

Unsers: "Isaac Newton driving" 317/1
Buzz Eye patch? 318/2
fix these windows 318/3

were for the right spacecraft 319/2
[illegible] 322/2
Quality of food 324/2 /3

APOLLO 8 MISSION COMMENTARY, 12/24/68, GET 1021200, CST 1:03 317/1

PAO This is Apollo Control, Houston at 102 hours 12 minutes into the flight. Frank Borman's family, his parents his wife, his two boys are in the Control Center and they just got a Christmas nod relayed to them from Apollo 8 by Mike Collins. Here's how the conversation went.

CAPCOM Apollo 8, Houston, say again.

SC Mike, we lost lock and Bill hit command reset to get the lock back on again, but you're welcome to the antenna.

CAPCOM Okay, Frank, thank you.

SC Houston, Apollo 8, over.

CAPCOM Apollo 8, this is Houston, go ahead.

SC Good morning, Michael.

CAPCOM Good morning.

SC (garbled)

CAPCOM Apollo 8, Houston, you've got a lot of back ground noise and about unreadable. We're trying to get a better OMNI. Apollo 8, Houston, how do you read, over.

SC Loud and clear.

CAPCOM Okay, you're loud and clear. Is this Bill?

SC Non other.

CAPCOM I got a message for you while you were asleep. Valarie said to tell you that she and the kids are leaving for church about 11:30 and eagerly awaiting your return. She said presents are magically starting to appear under the Christmas tree again so it looks like a double barrel Christmas, over.

SC You can't beat a deal like that. How was Christmas at your house today?

CAPCOM Early and busy as usual. I told Michael you guys are up there, and he said who's driving?

SC That's a good question. I think Isaac Newton is doing most of the driving right now.

CAPCOM Say again.

SC I think Isaac Newton is doing most of the driving right now.

CAPCOM Roger, we copy.

SC Give Valarie and the kids a Merry Christmas for me, Mike, and tell them I'll see them here in a while.

CAPCOM I sure will, and you might tell Frank that if he's got any messages his people are about 10 ~~feet~~ away.

SC He said bah hum bug. Howdy, how are you'll?

CAPCOM You've got a whole row of smiling faces in the back room, Frank.

SC Very good. Will they be proud of me, I'm using the . . . right now.

CAPCOM Don't over do it.
SC I won't.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/25/68. GET 1023000 CST 1:21PM 318/1

PAO Apollo Control Houston, here. 102 hours 29 minutes in the flight. couple of points we should mention for one Quad A the temperature that we reported earlier to peak up to 86 degrees now it's way down. Drop one degree it is now 85. And that drop has taken place in the past 15 minutes About 15 minutes ago into passive thermal control of a gentle slow roll did distribute the sun's heat evenly. Quad B is reading 71 degrees , Quad C 76 And Quad D like dog is 70. This temperature measurement comes from the helium tank which pressurizes the particular quad. We are planning a midcourse at last time 104 hours , 104 hours even. It will be burn of 5 feet per second. 5 feet per second. We're also planning a television acquistion at 104 hours 15 minutes which in relation to Houston time should be 3:06 pm central standard time . duration of the television pass is planned for 10 to 12 minutes. We do not know the content of the show and we have no schedule plans for it. Mrs. Frank Borman. who with Frank's parents and Frank and Susan's two sons just left the control center, forwarded a message this morning to Mrs. Bucher to Commander and his wife Bucker at the San Diego hospital, San Diego, California. The message is as follows: You have been in our thoughts and prayers. Your reunion has brought great joy to our hearts this Christmas . Our best to you personally to all the families under your command . Signed the families of the crew of Apollo 8. The message was composed and suggested by Mrs. Frank borman. It was forward by NASA Facilites this morning. We have some conversation with the crew and we will play it for you now.

CAP COM Apollo 8, Houston, Over.

SC Go ahead, Houston, Apollo 8.

CAP COM Roger. Quad Able helium tank temperature has dropped very slightly and it looks pretty good to us now.

SC Thank you, Michael.
I've got a procedure for Jim I would like to read up and it involves bringing the LM and the CMS state vectors to the earth servant ...

SC Alright, standby

CAP COM Okay

SC Getting his arrow now.
Whose procedure is this Michael?

CAP COM Oh its the agent of the opinions of our experts down here. I got it from Mr. Colossusdown at the MC.

SC Very good
I want make sure it was'nt an Aldrin special.

CAP COM I'm sorry you're broken up.

68/3

CAP COM No sig say again.
SC Merry Christmas Bud.
CAP COM Yeah, Merry Christmas up there Jim. I've got a procedure when your are ready to copy.
SC Okay. I just got a minute to set, just let me get a pencil and paper and I will copy it.
CAP COM Okay
SC Okay Mike
CAP COM Okay, the purpose is to bring the Lm and the CSM state vectors to earth trail of inflight. Step one: Verb 37 enter 23 enter . Step two: At noun 70, at noun 70, load and register 1 and 2 3 and the following numbers. 51, 0 0 0 0 2 register 2 5 .. register 3 0 0 2 1 0 Step 3: proceed on noun 70 comming up. Step 4: proceed on noun 25 to 25. Step 5: Do not proceed on noun 18. Wait for 30 seconds then do do verb 37 and enter zero, zero enter, end of procedure. Over
SC Okay, As I understand that the reason for this procedure is to bring the LM and CSM state vectors back to the earth ... is that correct.
CAP COM That's correct.
SC Okay, to do it we convert 37 enter and 23 enter and noun 70 load and register one. 4 balls two register 2 all balls and register 3 2 balls 210 Will proceed on that 70 and proceed on 25 and will not proceed on 18 wait 30 seconds and we will do a convert zero zero enter ...
CAP COM That's affirmative.
SC I'm just kinda curious I thought this was done for us. The computer took care of it so problem
CAP COM Roger, you're normally it is done automatically Jim. Have you 23's exactly as schedule it would have been but it's in doubt that P23 was stopped at 7 minutes (?)... prior to the transition point and just had to be absolutely sure that completely over.
SC Okay. Tell Buzz, I sure could use his eye patch.
cap com Roger. I understand
.. ...
Sc ... end of the procedure now.
CAP COM That's affirmative Jim. Now at your convience. Did you see guidance. Is the flag set? We set it that's right.
CAP COM Apollo 8, Houston.
SC Go Ahead.
CAP COM Thank you Jimmie, Copy your DSKY work there and its looking just fine to us now.
SC Okay.
cap com Apollo 8, Houston

SC You might try to work on that that way.
CAP COM Can you stand by Apollo 8?
CAP COM Apollo 8, Can you standby? Try to get you a better antenna. You're unreadable.
SC Alright.
CAP COM Apollo 8, Houston we are right in between antennas can you wait 5 minutes so we can hear better comments.
SC Roger.
CAP COM Apollo 8 Houston, Over
SC Go ahead Houston, Apollo 8.
CAP COM Okay you're loud and clear now Frank, Go head and say what you were going to say about program on it.
SC They ought get some moving out on some way to fix these windows cause the 3 windows the hatch window and the 2 side windows really its a shame in fact it's almost completely unusable because they got so gumped up.
CAP COM Roger I sure agree. We copy so far in the windows 2 and 4 are in excellent shape and one and 5 are sort of mediocre and 3 is just about totally unusable.
SC 3 is totally unusable 1 and 5 or unusalbe for any kind of photography.
CAP COM Got that
SC And Mike sure puts a ... that puts a bad light on cant see where you are going.
CAP COM Yeah, and you're setting between two guys that wont tell you too.
SC That's right. You think they will share a window no sir . Also know the optics are very good visibility down to good visibility too so far, no coating at all.
CAP COM Glad to hear that Jim.
PAO That was Jim Lovell who tag that one with the statement. Sure is a shame when the CMP the commander command module pilot can't see where he is going. It's a reference to the old navigatior joke. . I am a navigator and I have a right to know. Please tell me. So, we are all and all in good shape. 102 hours, 40 minutes into the flight This is Apollo Controi Houston.

END OF TAPE

68/4

PAO This is Apollo Control, Houston, 103 hours 7 minutes into the flight. Apollo 8 is 169 750 miles from home. It's moving in a velocity of 4264 feet per second. You multiply by a .68, you get miles per hour. In the last 15 minutes we've had a good deal of conversation with the crew. And in the course of it, Frank Borman makes a comment, a reference about the windows. He says they are really a shame. We discussed them yesterday, and the message was immediately relayed to George Lowe. And in the course of the ensuing discussion, Mike Collins suggest that perhaps the crew should have had Spacecraft 104 which is the next one down the line. And Borman insists no, no. He had the right spacecraft. And it's a most interesting conversation, here's how it goes.

CAPCOM Apollo 8, Houston.

SC Go ahead.

CAPCOM Roger, we copy Jim doing a P52, and I'm standing by with a maneuver pad for midcourse 5 anytime at your convenience.

SC Okay, ready to copy, Mike.

CAPCOM Roger, Jim. This is midcourse maneuver number 5, and it's a RCS/G&N, and it's 317 00, not applicable, not applicable. Are you with me?

SC With you.

CAPCOM Good. 103 59'er 5286 minus 00050 plus all zero's plus 00001 000 334 001, five zero's 00000 plus 0019'er0 00050 014 00050, are you still with me, over.

SC Still with you.

CAPCOM Good. 413020 183 charla down 064 left 06 plus 0747 minus 16410 129'er88 36301 146 4640 north set of stars, Sirius and Rigel, roll 308 pitch 209'er yaw 357. Remarks use high speed procedure with minus MA, over.

SC Roger, Houston. MCC 5 RCS G&N, are you with me?

CAPCOM I'm with you, Jim.

SC 31700 NA NA 103 59 5286 minus 00050 plus all zero's plus 00001 000 334 001, all zero's plus 00190 00050 014 00050 413020 183 charla down 064 left 06 plus 0747 minus 16410 12988 36301 146 4640 Sirius Rigel 308 209 357, use high speed procedure with minus MA.

CAPCOM Roger, and could you go to accept please and we're going to send you a P27 load consisting of a LM state vector and a target load for MCC 5.

SC Roger.

CAPCOM Apollo 8, Houston, over.

SC Go ahead, Houston, Apollo 8.

CAPCOM Roger, we'd like to dump your waste water tank down to 25 percent. We'd like to do it before the midcourse for tracking reasons. So if it is convenent with you, if you'll

start right now, we'll dump on down to 25.

SC Roger, we'll get right with it.

CAPCOM Thank you. Apollo 8, Houston.

SC Go ahead.

CAPCOM Roger, we got those loads in and verified. You can go back block at your computer. And George Low says he's working on that window problem at 6, or Spacecraft 104. You just happen to have the wrong spacecraft.

SC That's the wrong statement, we've got the right spacecraft. I'll clue you if it keeps going this way for 2 more days, we've got not only the right spacecraft, but we've got the best spacecraft.

CAPCOM It'll keep going.

SC Apollo 8, we're starting the dump now, Houston.

CAPCOM Apollo 8, Houston, over.

SC Okay, we're starting the waste water dump now.

CAPCOM Okay, Bill, thank you.

SC That's a blizzard.

CAPCOM Roger, understand. Apollo 8, Houston.

SC Go ahead, Houston.

CAPCOM Roger, I need a Pop-Romeo-Dog on all three and a status report on the LMP.

SC Roger, the LMP's PRD hasn't moved an inch since we took off. And that's the one the CMP used to have, still .64. And I just had about 5 and a half hours sleep, and I'm in the process of scarfing up a meal, and I've been drinking lots of water, feeling good, and that's about it.

CAPCOM Okay, and you got a PRD on the other two.

SC Yes, the PRD is ready to report. The CMP is reading 1.2 rem. And the CDR, I got stuck with somebodyelses, but my reads now, my new one reads 2.02 rems. I don't know if there is a message there or not. He's starting to glow in the dark.

CAPCOM Yeah, you should have hung on to the one you had. It sounded a little bit better. I copy left to right 2.02, .12, and .64, over.

SC Roger.

CAPCOM Thank you, sir.

SC What have they measured in our - what have they measured on that, I guess you would call it the PABABR, or PABD.

CAPCOM We're sending the boy to the back room to find out.

SC Find out what it is, or what it's reading?

CAPCOM First one, and then the other.

68/9

SC We'll need both answers up here, too.

END OF TAPE

SC We'll need both of the ... up here too.
CAPCOM Apollo 8, Houston.
SC Go ahead.
CAPCOM Bill's VA and VR reading that he requested is .13. Over.
SC Roger. Look's like you've got a little discrepancy here.
CAPCOM Yes, I agree.
SC You ought to give those guys a chance to ... and calibrate those things.
CAPCOM Apollo 8, Houston. We've just had 25 percent. You can terminate your waste water now, please.
SC Okay. Will do. Believe it or not, our gauge is 5 percent behind yours.
CAPCOM Yes, John said that he has been noticing that.
CAPCOM Apollo 8, Houston.
SC Go ahead, Houston, Apollo 8.
CAPCOM Yes, we are going to switch antennas from Madrid to Goldstone in about 3 minutes. You should hear the glitch.
SC Thank you. Houston, Apollo 8.
CAPCOM Apollo 8, Houston. Over.
SC Rog. Just for information would the perigee reading and noun 42 be such a big minus number for such a small burn? We are reading minus 03137 now.
CAPCOM Roger. Understand noun 42 perigee reads minus 03137. Over.
SC Roger. We are going to program 30 after you gave us the target load, and I didn't think there would be that much of a change for such a small burn.
CAPCOM Roger. Stand by, checking.
CAPCOM Apollo 8, Houston.
SC Go ahead, Houston, Apollo 8.
CAPCOM Roger, Frank we don't think theres's any problem or any funnies in this perigee prediction of minus 03137. It if ... prediction and it's not very accurate. Now we have taken your vector from the downlink and run it through a make believe Delta V maneuver down here, and we get precisely the correct answer. Over.
SC Roger. Understand that you figure just because ... it comes up.
CAPCOM That's affirmative. The Kepler solution is just pretty gross
SC Okay. I was just kind of curious. I could see differences when we were talking about LOI burns. This being such a short one, I thought it wouldn't be that much difference. I understand. Mike, this is Frank.

CAPCOM Go ahead.
SC Tell our monitoring -- see if we get any inadvertent engine firing for the time ...
CAPCOM Well, we can't when you're in low bit rate. We're in high bit rate right now.
SC Okay. Can we crank up high bit rate and just have you take a checkout look at it?
CAPCOM Okay.
CAPCOM Apollo 8, Houston.
SC Go ahead.
CAPCOM Roger. Since you're on OMNI D dog it this time, we're sort of 180 out of phase for the high-gain antennas. We can get high gain lock then with the high bit rate we can be looking at those or looking for any justifiers, but we can't do it until ...
SC Okay. We will take the antennas and get on the high gain as soon as we can.
CAPCOM Thank you.
PAO This is Apollo Control, Houston. And that catches us up to 103 hours 21 minutes. We're now about 45 minutes away from a -- 40 minutes away from the burn. A midcourse correction of 5 feet per second. The spacecraft will have had its nose pointed at Scorpio. I do not know exactly what angle that will be in along its path of flight. It will apprently not be in the direct line of flight. It will be a slight adjustment kind of burn to have the effect to move the spacecraft more to the center of a 35 mile corrider key hole through which the spacecraft will enter the atmosphere that's -- in it's final splashdown maneuver. At 103 hours 23 minutes into the flight, this is Apollo Control, Houston.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/25/68,GET 1034500, CST 2:36PM 321/1

PAO This is Apollo Control, Houston, at 103 hours 45 minutes into the flight. In the last few minutes we have been looking at the Biomed data, the harness is switched to Jim Lovell and his mean heart rate is 57. The high during this sample period is 59, the low is 54. His respiration rate is 13. Jim and Bill Anders are shortly to have Christmas dinner, just after this midcourse correction which is to come at 104 hours into the flight. The 5 foot per second burn that will have the effect of insuring the spacecraft hits more nearly the center of our entry corridor, rather than the high side of it. We have some taped conversation backed up here. We'll play it now.

CAPCOM Roger, Frank. We've done some more checking and we confirm that that is the correct keplerarian prediction on noun 42 minus 03137, just like you said.

SC Thank you.

CAPCOM Apollo 8, Houston.

SC Go ahead.

CAPCOM Roger, we are going to be doing a ranging sequence, if we can eliminate voice for a couple of minutes, we would appreciate it.

SC Roger, We will.

CAPCOM (Garbie)

CAPCOM Apollo 8, Houston. Over

SC Go ahead Houston.

CAPCOM Roger, our ranging is complete and we have been monitoring your thruster firings and they show what appears to be very normal damp activities. Over.

SC Thank you. I guess it was associated with the water vent.

CAPCOM Roger, Understand.

PAO This is Apollo Control, Houston. 103 hours and 47 minutes into the flight. We will be back after the burn in about 12 minutes.

END OF TAPE